



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

by the present state botanist in acknowledgment of his contributions and interest in the state flora, and such a piece of work as the present one is necessarily replete with the results of long familiarity with the local flora.

The special feature of this report is the article on the subject of edible fungi. It has been known for a long time that the author was accumulating colored drawings and mycophagic notes pertaining to the food fungi of the state, and a special monograph on the subject has been expected. The difficulty of securing its independent publication has led to its incorporation in the annual report. Mr. Peck gives most valuable assistance and suggestions regarding the collection and use of this highly nutritious and palatable food, founded upon personal experience and ripe knowledge. Sixty-three edible species and four harmful ones are described and figured. The forty-four colored plates, with figures of the fungi natural size, add greatly to the value of the report. The lithographic work, although it cost the state over \$3000, falls somewhat short of being entirely satisfactory. Only twice before, in 1869 and 1870, have the botanist's annual reports been supplemented with colored plates, and they were then somewhat better executed than are the present ones.

It has always been a source of regret that the state makes no provision for the sale of public documents of this character. Such a valuable publication ought to be obtainable by everyone who chooses to pay a reasonable price for it. Now that the general government has set a commendable example of offering scientific and other documents for sale at nominal prices, it is hoped that the states will adopt a similar method, and thereby greatly increase the permanent usefulness of the scientific work which they foster.—J. C. A.

### The reproduction of plants.

In 1891 and 1892 Professor M. Möbius published in the *Biologisches Centralblatt* two papers on the effect of continuous vegetative propagation and the conditions on which blooming depends. Last year he contributed one on the development and significance of sexual reproduction in the plant kingdom. He has brought these papers together and added such other discussion as seemed necessary "to place the phenomena of reproduction in the right light in relation to other vital phenomena, and, at the same time, to distinguish correctly in conformity therewith the different sorts of reproduction in plants." The result is a volume of five chapters and something over 200 pages.<sup>6</sup>

In the introduction the two kinds of reproduction are defined and characterized. These are reproduction by buds (Knospen) and by germs (Keime). Instead of distinguishing reproduction into sexual and non-sexual methods,

<sup>6</sup>MÖBIUS, M.—Beiträge zur Lehre von der Fortpflanzung der Gewächse. 8vo. pp. viii+212. figs. 36. Gustav Fischer: Jena. 1897. M 4.50.

the author's point is that the real distinction lies in the rejuvenation of the cell or cells in the case of germs and the absence of any such change in the case of buds. "Spores and seeds," he says, "are germs in the sense that in their production rejuvenation of a cell has taken place; that the former have arisen in a purely asexual manner and the latter have arisen by fertilization is a secondary difference which is without significance for multiplication." In contrast to this "in multiplication by buds no rejuvenation occurs, but only a growth by ordinary cell division."

In the second chapter Möbius undertakes to show that the idea that plants continuously propagated by cuttings, offsets, tubers, etc., become weakened and are more liable to epidemic diseases, has no basis in fact. In combating this idea he brings together many interesting facts regarding both wild and cultivated plants which are propagated vegetatively.

The third chapter, "on the conditions upon which the blooming of plants depends," is a presentation of the relations of the age of the whole organism or of certain shoots, light, temperature, moisture, etc., to blooming. The fourth chapter discusses the relation between germ and bud reproduction for the purpose of showing that in most cases vegetative reproduction is not the primary method but one into which plants have been forced when external conditions have repeatedly prevented the formation of flowers or fruit.

In the last chapter the author shows the steps in the evolution of sexuality among the algæ, and finds the significance of sexuality in the opportunity it gives through crossing for the origination of new species and for the production of more complex forms; *i. e.*, to put it as usual, sexual reproduction is a prolific source of variation.

The thesis of the book to which other ideas are subsidiary is that the distinction between the modes of reproduction is to be found in the rejuvenation of the reproductive cell in one case and its absence in another. This seems a very tenuous thread on which to string so many important phenomena. That rejuvenation does occur in many cases is readily seen; that it occurs in the spores of fungi has been proved in only a few cases, and that doubtfully; the rest is assumption. Moreover, since all such distinctions are merely classificatory conveniences in the arrangement of observed facts, it strikes us that there is little value in making the thread so fine as to be grasped with difficulty when we wish to add a new pearl to the strand. Copulation of gametes is an easily observed phenomenon and will serve pedagogical purposes much better than the new proposition. Thus we may clearly distinguish sexual and non-sexual reproduction in the thallophytes, among which it is not worth while to attempt to distinguish non-sexual from vegetative reproduction. That becomes important only in bryophytes and higher plants, among which it is readily done by applying the term non-sexual to reproduction (here by spores) which gives rise to the alternate phase in the life cycle (the

gametophyte), and the term vegetative to those methods which produce the same phase again.

Furthermore, a classification which brings together seeds and spores, as the proposed scheme does under the term *Keime*, will be as prolific of misconception as their frequent comparison has ever been.

We become early suspicious of the book when we find the author postulating a species as an entity. How can anyone who has studied plants write such a sentence as this: "Nun aber ist der Natur nur an der Erhaltung der Species gelegen und die Individuen dienen nur um die Idee der Species in der Welt der Erscheinungen zu repräsentiren!" Much confusion of ideas appears in the frequent comparisons drawn between the gametophytes of the lower plants and the sporophytes of the higher; even the "flowers" of mosses and the flowers of seed plants are compared! Among other curiosities we find definition of an individual: ". . . ein Körper, der sich nicht theilen lässt und zwar so, dass die Theilung unmittelbar zwei oder mehrere neue vollständige Körper ergibt." How would Möbius apply this to such a plant as *Caulerpa*? Or to almost any thallophyte for that matter?

The impression that the book leaves is that the author has endeavored to assimilate modern ideas of morphology without complete success; that these ideas have opened out to him visions of possible coordination of facts which he has not yet thought through to their logical outcome; and that he has allowed obsolete views of the relations of the flowering plants to the lower ones to distort his newer conceptions. Among the latter there are some of value, but they are not new nor are they presented with sufficient clearness to make the book one of any real importance.—C. R. B.

## NOTES FOR STUDENTS.

KLEBAHN has continued his studies on zygotes with the investigation of the auxospore formation in a diatom, *Rhopalodia gibba* O. Müller.<sup>7</sup> In this species the process involves an undoubted sexual act in the copulation of gametes of separate origins. The mother cells of the gametes are very commonly of unequal size. They become attached to each other side by side, and the nucleus of each divides first into two and then into four daughter nuclei, of which two remain small. Each mother cell then divides by constriction transversely in such a way that the daughter cells each contain two nuclei, one large, the other small. These daughter cells are the gametes, and they fuse in pairs, one gamete of each fusing pair being derived from each of the two mother cells. The small nuclei have generally disappeared during fusion. The so formed zygotes then grow out at right angles to the long axes of the mother cells and form auxospores. The large nuclei fuse quite late in

<sup>7</sup> "Beiträge zur Kenntniss der Auxosporenbildung, I. *Rhopalodia gibba* (Ehrenb.) O. Müller." Jahrb. für wiss. Bot. 29: Heft 4. 1896.